Vascular and Cardiac Adult Stem Cell Therapy Center (VC-CAST)

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The mission of the Vascular and Cardiac Adult Stem Cell Therapy Center (VC-CAST) is the discovery and clinical translation of therapies involving transplantation of adult stem cells into patients with debilitating diseases.

VC-CAST fosters multidisciplinary research collaborations that address the biology of adult stem cells that are readily available, as well as the translation of their study from the laboratory into clinical trials. The use of such cells is highly feasible, and not ethically controversial, as they are derived from readily-available tissues such as fat and bone marrow. VC-CAST projects involve partners from multiple clinical and basic departments of the School of Medicine. VC-CAST projects are also collaborative externally, with most projects having one or more industrial or academic external partners. A key partnership has also been established at the Roudebush VA Medical Center in Indianapolis by creation of the Veterans Affairs Center for Regenerative Medicine (VACRM), which will provide a unique referral site focusing on research and implementation of first-in-human trials in the fields of poor circulation, stroke, arthritis, wound healing, diabetes, and emphysema. Given the focus on translation, the center is active in pursuit of intellectual property that is critical to building corporate engagement and thus the enablement of translation to clinical trials. Signature Center funding has allowed IUPUI investigators to try **high-risk, high-reward ideas**, which could not otherwise be funded readily, via either NIH or venture-capital methods. Most of these experiments have already led to **discoveries of potentially critical significance to patients.** The novelty of some of these discoveries has attracted new funding, as well as provided bases for potential **licensing revenues** and **startup opportunities**. This poster will highlight several such projects, representative of center activities in their multidisciplinary, translational, and potentially commercializable aspects. Several key projects are as follows:

- **Saving Legs from Amputation**
    - Bone Marrow Stem Cells: Based on our completion of the Phase I/II clinical trial, "Stem cell Angiogenesis to promote limb salVagE (SAVE), we have initiated a randomized Phase III clinical trial testing one's own bone marrow-derived stem cells to save legs from amputation, with Dr. Murphy as national PI.
    - Fat-derived (Adipose) Stem Cells– we are testing the hypothesis that these are more potent than Bone Marrow-derived stem cells with new funding from a corporate partner as well as the Department of Defense.
    - Endometrial Regenerative Cells– further extending above efforts, with new NIH funding to study this allogeneic (non-self, "off-the-shelf") cell type.
- **Treatment of Heart Attack and prevention of Heart Failure**. New data this year shows Adipose Stem Cells protect from heart damage when given systemically.
- **Treatment of Emphysema and other Lung Diseases**. Adipose Stem Cells markedly protect from cigarette smoke-induced emphysema, a generally untreatable condition.
- **Prevention and Treatment of Diabetes**– Adipose Stem Cells can ameliorate diabetes. This work has attracted new Veterans Affairs funding this past year.

- **Treatment of Parkinson's Disease** by rescue of dopaminergic neurons from death. New funding attracted in the past year by the Signature Center led to preclinical data that extended prior work in stroke models to models of Parkinson's Disease. These data suggest that the conditioned medium from ASCs can be useful in this debilitating condition, and form the basis for a new NIH application.
- **Treatment of Diabetic Retinopathy by vascular stabilization** using adipose stem cells. This is a new project in the past year, and has generated encouraging early data which is being used in seeking further (external) funding.
- **Human Placenta as a stem cell source:** Isolation and Characterization of Endothelial and Mesenchymal Stem Cells from Term Placenta.
- **Human Saphenous Vein as a cell source:** Isolation and Characterization of Endothelial Colony Forming Cells (ECFCs) from Human Saphenous Vein can form the basis for vascular network formation.